# INDEX TO VOLUME 14

## Authors


A

Abegg, C. F. ..... 118
Ackerman, G. H. ..... 69
Ahlert, R. C. ..... 816
Albright, Lyle F. ..... 325
Amundson, Neal R. ..... 211, 636, 993
Ananthakrishnan, V. ..... 939
Angelo, J. B. ..... 531
Arakawa, Shin-Ichi ..... 962
Armour, James C. ..... 415

B

Baasel, W. D. ..... 722
Baldwin, Lionel V. ..... 825
Barduhn, Allen J. ..... 100
Barrere, C. A. ..... 280
Beaver, P. R. ..... 746
Berbente, C. P. ..... 722
Berger, Albert J. ..... 356, 558
Berman, Neil S. ..... 497
Biguria, G. ..... 816
Bird, R. B. ..... 758
Bischoff, Kenneth B. ..... 820
Bjorklund, I. S. ..... 553
Blanco, Jose A. ..... 505
Blumberg, Paul N. ..... 331
Brodkey, Robert S. ..... 61
Bromley, L. A. ..... 245
Brosilow, C. B. ..... 467
Brown, F. C. ..... 750
Brown, L. F. ..... 696
Brown, R. W. ..... 657
Bryant, Philip A. ..... 852
Buckles, R. G. ..... 703
Buffham, B. A. ..... 805
Burkhart, L. E. ..... 411
Butt, John B. ..... 966, 993

C

Camp, David T. ..... 19
Canjar, Lawrence N. ..... 19
Capes, C. E. ..... 917
Carberry, James J. ..... 483
Chang, Harry L. ..... 318
Chappelear, Patsy S. ..... 318, 568
Chen, M. C. S. ..... 123
Chen, Show-An ..... 973
Cheng, K. C. ..... 510
Chiang, S. H. ..... 664
Chung, S. F. ..... 857
Clements, William C., Jr. ..... 363
Clump, Curtis W. ..... 164
Collins, C. G. ..... 25
Collins, Morton ..... 993
Colver, C. P. ..... 353
Corrigan, Thomas E. ..... 813
Coughnowr, D. R. ..... 502
Cramer, S. D. ..... 814, 980
Crandall, Edward D. ..... 483
Crider, J. E. ..... 77

D

Davis, R. M. ..... 227
Davison, E. J. ..... 46
Deans, H. A. ..... 25, 280
de Chazal, L. E. Marc ..... 169
Deepak, Chand ..... 827
Delancy, G. B. ..... 664
de Nevers, Noel ..... 222
Dickinson, Dean R. ..... 541
Dickson, P. F. ..... 903
Dillard, D. D. ..... 923
Distefano, G. P. ..... 190, 946
Dodge, B. F. ..... 392
Doninger, Joseph E. ..... 591
Drake, E. M. ..... 251
Duda, J. L. ..... 286
Dygert, J. C. ..... 553

E

Eben, Carl D. ..... 32
Edmister, W. C. ..... 479, 923
Erbar, J. H. ..... 923
Erickson, L. E. ..... 726
Estrin, Joseph ..... 678
Evans, Lawrence B. ..... 251, 956

F

Fan, L. T. ..... 726
Ferron, John R. ..... 32
Foss, A. S. ..... 77
Foster, Richard N. ..... 966, 993
Fox, V. G. ..... 726

G

Gal-Or, Benjamin ..... 709
Garlid, Kermit L. ..... 3
Gaston, J. W. ..... 816
Gibilaro, L. G. ..... 805
Gill, William N. ..... 100, 505, 715, 939
Gillespie, Bernard M. ..... 483
Gilliland, E. R. ..... 703
Goldstein, Charles ..... 357
Gomezplata, A. ..... 657
Gonzales, M. H. ..... 242
Goren, Simon L. ..... 57, 151
Graham, R. R. ..... 473
Greenfield, Gaylord G. ..... 783
Grieves, Robert B. ..... 962
Gully, A. J. ..... 473
Gupta, G. P. ..... 519

H

Haberstroh, Robert D. ..... 825
Hall, Kenneth R. ..... 833
Halligan, J. E. ..... 411
Han, C. D. ..... 612
Handley, K. R. ..... 467
Hanks, Richard W. ..... 691
Harano, Yoshio ..... 584
Harris, E. K., Jr. ..... 758
Harris, H. G. ..... 737, 812
Hawes, Russell W. ..... 606
Hawthorne, R. D. ..... 69
Hershey, Daniel ..... 807, 969
Hildebrand, Richard E. ..... 660
Hill, F. B. ..... 798
Hirth, L. J. ..... 812
Holtz, Robert E. ..... 654
Howard, D. W. ..... 458
Hubbard, Davis W. ..... 354
Hughmark, G. A. ..... 352, 746
Hung, Yen-Chi ..... 169
Hwang, Guang-Jyh ..... 510
Hwang, Sun-Tak ..... 809

I

Im, Chi Soon ..... 807
Ishida, M. ..... 311
Iskander, Magdi ..... 827

J

Jenczewski, T. J. ..... 509
Johns, L. E., Jr. ..... 275
Jones, D. T. ..... 658

K

Kabel, Robert L. ..... 358, 606, 627
Kaplan, Richard ..... 821
Karhan, Terry ..... 969
Kaufmann, Thomas G. ..... 110, 421
Kehat, Ephraim ..... 398, 831
Kelman, Sheldon ..... 963
Kim, H. T. ..... 61
Kittrell, James R. ..... 513
Klekers, A. J. ..... 479
Kobayashi, Riki ..... 92, 318, 740
Kohlmayr, G. F. ..... 499
Kosky, P. G. ..... 372
Kostecki, John A. ..... 19
Kwasnoski, Daniel ..... 164
Kranich, W. L. ..... 750

L

Lapidus, Leon ..... 356, 558
Larson, M. A. ..... 118, 448, 452
Laurence, R. L. ..... 357
Leach, J. W. ..... 568
Lee, A. L. ..... 242
Lee, E. Stanley ..... 490, 908, 977
Lehr, Carl G. ..... 627
Leland, T. W. ..... 568
Leonard, Edward F. ..... 110, 421
Lescarboura, J. A. ..... 123, 651
Letan, Ruth ..... 398, 831
Lightfoot, E. N. ..... 458, 531, 620, 669, 674, 835
Liu, Henry ..... 983
Ludviksson, V. ..... 620, 674
Luecke, R. H. ..... 173, 181
Luss, Dan ..... 211, 636, 966, 993
Luyben, William L. ..... 37, 880
Lyon, D. N. ..... 372

M

McGuire, M. L. ..... 173, 181
McIlhinney, A. E. ..... 917
MacLatchey, C. S. ..... 260
Ma, Yi Hua ..... 956
Magarvey, R. H. ..... 260
Mani, R. V. S. ..... 57
Maneri, Charles C. ..... 295
Marchello, J. M. ..... 814, 980
Marino, Pasquale A. ..... 866
Marshall, W. R., Jr. ..... 541
Masukawa, Shigehiko ..... 740
Maurer, Charles J. ..... 3
Meister, Bernard J. ..... 9
Mellish, W. G. ..... 668
Mendelson, Harvey D. ..... 295
Merliss, F. E. ..... 353
Merrill, E. W. ..... 703
Mezaki, Reiji ..... 513, 984
Mills, R. ..... 671
Mohr, C. Michael ..... 331
Myers, A. L. ..... 509

N

Nakano, Yoshisuka ..... 145
Nixon, A. C. ..... 69
Nunge, Richard J. ..... 505, 939

O

O'Brien, Vivian ..... 870
Olander, Donald D. ..... 235
Osburn, James O. ..... 876

P

Padmanabhan, Lakshminarasimha ..... 709
Pasternak, Alan D. ..... 235
Patterson, G. K. ..... 434
Pearson, R. S. ..... 903
Penny, W. Roy ..... 661
Perlmutter, D. D. ..... 335, 934, 976
Perna, Angelo J. ..... 866
Phillips, J. R. ..... 392
Porter, J. W. ..... 151, 245
Potter, O. E. ..... 388
Prausnitz, J. M. ..... 135, 673, 737, 812

R

Rafal, Marshall D. ..... 85
Randolph, Alan D. ..... 827
Read, S. M. ..... 245
Reid, R. C. ..... 251
Reiss, N. ..... 798
Renon, Henri ..... 135
Reejhsinghani, N. S. ..... 100
Rimple, August E., Jr. ..... 19
Roberts, George W. ..... 159
Robinson, R. L., Jr. ..... 923
Rogers, John D. ..... 895
Ruckenstein, Eli ..... 722
Rudd, Dale F. ..... 343

S

Satterfield, Charles N. ..... 159
Savage, H. R. ..... 266
Saxena, S. C. ..... 519
Scheele, George F. ..... 9
Schick, L. M. ..... 673
Schiesser, W. E. ..... 817
Schindler, Harvey D. ..... 790
Schmidt, E. H., Jr. ..... 678
Schmitz, R. A. ..... 301
Schneider, Petr ..... 762, 886
Schoenberg, T. ..... 986
Schowalter, W. R. ..... 993
Schrodt, J. Thomas ..... 963
Schwartz, Clarence E. ..... 833
Schweickart, Maria C. P. ..... 833
Shendalman, L. H. ..... 599, 798
Sheppard, Robert G. ..... 876
Shih, Yen-Ping ..... 502, 973
Shinnar, Reuel ..... 612
Shukla, N. P. ..... 666
Singer, Ralph M. ..... 654
Slattery, John C. ..... 50, 516

Smith, Clayton S. ..... 325
Smith, J. M. .....584, 650, 762, 886
Snider, Dean ..... 813
Steisel, Norman ..... 966
Stella, Richard ..... 838
Stern, Frederick ..... 928
Sterrett, J. S. ..... 696
Stevens, J. D. ..... 118
Stevens, William F. .....85, 591
Stevenson, Warren H. ..... 350
Stone, James R. ..... 507
Straight, Frank ..... 722
Stutzman, Leroy F. ..... 866
Swift, G. W. .....123, 651
Sy, Francisco ..... 835

T

Tallmadge, John A. ..266, 660, 837, 838
Talmor, Eliyahu ..... 127
Tao, Luh C. .....720, 988
Telles, A. S. ..... 440
Thomas, David G. ..... 644
Tien, Chi .....145, 652
Timm, Delmar C. .....448, 452
Treybal, Robert E. ..... 790
Tsai, F. Y. ..... 663
Tsuchiya, Susumu ..... 351

V

Vairogs, J. ..... 479
Vanderveen, John W. .....636, 993
Van Horn, Lloyd D. ..... 92
Vidaurri, F. C., Jr. ..... 473
Vivian, J. E. ..... 986
Voorhies, Alexis, Jr. ..... 852
Votta, Ferdinand, Jr. ..... 928
Vrentas, J. S. ..... 286

W

Walters, K. ..... 658
Wang, Frank S. .....335, 934, 976
Ward, Thomas J. ..... 783
Wasan, Darshanlal T. .....227, 577
Watts, R. O. ..... 671
Wells, C. Sinclair, Jr. ..... 406
Wen, C. Y. .....311, 857
Wetzel, J. M. ..... 663
Wilke, Charles R. .....151, 227, 577
Williams, Michael C. ..... 360
Winegardner, D. K. ..... 301
Winter, Olaf ..... 426
Wolff, P. R. ..... 448
Woolf, L. A. ..... 671
Woollard, I. N. M. ..... 388

Y

Yoshida, Fumitake ..... 962
Yurchak, Sergei ..... 627

Z

Zakin, J. L. ..... 434
Zeh, Dale W. ..... 715

# Titles

A

Accuracy of the Axial Dispersion Model for Chemical Reactors 820
Activity Corrections to Diffusivities in Polymeric Materials ..... 357
Adsorption Rate Constants from Chromatography ..... 762
Algorithm for Use with Multiterm Lennard-Jones Potentials, An 816
Analysis of Optimal Composite Feedback–Feedforward Control ..... 181
Analysis of Oxygen Absorption in a Tubular Membrane Oxygenator, An ..... 703
Analysis of Steady State and Stress Relaxation in the Maxwell Orthogonal Rheometer ..... 758
Analytic Solution for the Dynamics of a Packed Adiabatic Chemical Reactor, An ..... 77
Applicability of Dispersion Results to Packed Columns ..... 668
Application of Theoretical Diffusion Models in the Presence of a Catalytic Reaction, The .... 696
Axial Dispersion Coefficient Measurement in Two-Phase Flow 657

B

Behavior of Non-Newtonian Fluids in the Inlet Region of a Channel [Vol. 9, p. 98 (1963)]. Erratum ..... 993
Bounding Chemical Reactor Transients by Estimation of Growth or Decay Rates ..... 934
Bounds on the Effectiveness Factors for Exothermic Catalytic Reaction ..... 966
Bubble-Driven Fluid Circulations 222

C

Calculation of Viscosity and Diffusion Coefficients of Nonpolar Gas Mixtures at Ordinary Pressures ..... 519
Calorimetric Determination of the Isothermal Effect of Pressure on the Enthalpy of Methane and Two Methane-Propane Mixtures ..... 923
Catalytic Dehydrogenation of Cyclohexane: A Transport Controlled Model ..... 473
Chromatographic Study of Surface Diffusion ..... 886
Comments on Turbulence Measurement in Water Using an Electrokinetic Probe ..... 983
Comparison of Kinetic and Diffusional Models for Solid-Gas Reactions ..... 311
Comparison of Theoretical and Experimental Results for the Internal Dissolution of Soluble Cylinders in Water in Laminar Flow, A ..... 722
Comparison of Two Methods Used in Analysis of Reactor Dynamics ..... 976

Composite Phase Piane for Tubular Reactor Stability Studies, A 335
Computational Model for the Structure of Porous Materials Employed in Catalysts, A [Vol. 12, p. 180 (1966)]. Erratum .... 993
Computational Procedures for Recent Analyses of Counterflow Heat Exchangers ..... 505
Concentration-Dependent Time-Lag Measurements ..... 392
Condensation from Superheated Gas-Vapor Mixtures ..... 928
Conjugate Inequality for General Means with Applications to Extremum Problems, A ..... 32
Continuous-Phase Mass-Transfer Coefficients for Liquid Extraction in Agitated Vessels ..... 790
Convective Diffusion in Rotating Disk Systems with an Imperfect Semipermeable Interface 715
Convective Diffusion in Stagnation Flow with an Imperfect Semipermeable Interface [Vol. 13, p. 1014 (1967)]. Erratum .. 207
Correlation of Mass Transfer Data: Comments on an Article by Son and Hanratty ..... 354
Correlation of Vapor-Liquid Equilibria of Light Hydrocarbons in Paraffinic and in Aromatic Solvents at Low Temperatures and Elevated Pressures, The 92
Correlation of Vapor-Liquid Equilibria of Methane in Paraffinic, Naphthenic, and Aromatic Solvents at Low Temperatures and High Pressures, The ..... 318
Correlations for Adsorption of a Binary Gas Mixture on a Heterogeneous Adsorbent—the Methane-Ethane-Silica Gel System ..... 740
Correlations of Stress Data in Viscoelastic Polymer Solutions .. 360
Coupled Energy and Multicomponent Mass Transfer in Dispersions and Suspension with Residence Time and Size Distributions ..... 709
Creeping Flow of Power-Law Fluid over Newtonian Fluid Sphere 145
Critical Reynolds Number for Sinusoidal Flow of Water in Rigid Tanks ..... 807
Crystal Size Distributions in Continuous Crystallizers when Growth Rate is Size Dependent 118
Crystallization on a Constant Temperature Surface ..... 661

D

Deformation of Advancing Menisci 674
Density and Pressure Fluctuations in Gas Fluidized Beds ..... 426
Determination of the Profile of a Growing Droplet ..... 411
Diffusion Coefficients for Oxygen Transport in Whole Blood .. 969
Dimensional Considerations in Viscoelastic Flows ..... 516
Direct Chromatographic Equilibrium Studies in Chemically Reactive Gas-Solid Systems .. 25
Direct Contact Heat Transfer Between Immiscible Liquids in Turbulent Pipe Flow ..... 151
Direct Evaluation of Withdrawal Equations ..... 660
Discrete Dynamic Optimization Applied to On-Line Optimal Control ..... 85
Dispersion in Developing Velocity Fields ..... 939
Drop Formation at Low Velocities in Liquid-Liquid Systems ... 9
Dufour Effect in Liquid Systems .. 664
Dynamic Behavior of a Packed Liquid Extraction Column, The .. 591
Dynamic Optimization with Constraints from Wiener's Techniques ..... 173

E

Eddy Diffusivity Close to a Wall 352
Effect of Distortion on Mass Transfer to Spheroidal Drops, The 835
Effect of Eccentricity on the Terminal Velocity of the Cylinder in a Falling Cylinder Viscometer, The ..... 123
Effect of Eccentricity on the Terminal Velocity of the Cylinder in a Falling Cylinder Viscometer, The: Experimental Verification for Newtonian Fluids 651
Effect of Imperfect Mixing on Autorefrigerated Reactor Stability 880
Effect of Nucleation Kinetics on the Dynamic Behavior of a Continuous Crystallizer ..... 452
Effect of Orientation on the Settling Characteristics of Cylindrical Particles ..... 331
Effect of Pressure Gradient on Sonic-Point Heat Transfer .. 127
Effect of Suspension Density on Crystal Size Distribution .... 448
Effect of Triple-Bond Position on Thermodynamic Properties of Mixtures: Phase Equilibria for the System Acetone-3-Hexyne 812
Effect of Wall Deposit on Photochlorination Kinetics [Vol. 13, p. 1025 (1967)]. Erratum .. 368
Effective Diffusivities for the Ortho-Para Hydrogen System ..... 966
Electrodialysis of Monocarboxylic Acid Salts ..... 963
Enhancement of Film Condensation Rate on Vertical Tubes by Longitudinal Fins ..... 644
Evaporation of Liquid Droplets Containing Surface Impurities 502

F

Feedforward and Dynamic Uncoupling Control of Linear Multivariable Systems ..... 783
Fluid Flow through Woven Screens 415
Form Factors for Deformed Spheroids in Stokes Flow ..... 870
Free Convective Effects on Stokes Flow Mass Transfer ..... 903

G

Generalization of the Tanks-in-Series Mixing Model, A ..... 805
Generalized B-W-R Equation of State, A ..... 479
Generalized Solution of Freezing a Pure Liquid in a Container Initially at its Melting Temperature ..... 720
Geometric View Factors for Parallel Directly Opposed Rectangles ..... 353
Graphical Viscosity Correlation for Hydrocarbons ..... 242

H

Heat Transfer Coefficients and Circulation Rates for Thermosiphon Reboilers ..... 746
Homogeneous versus Heterogeneous Rate Equations for Catalytic Reactions ..... 358
Hydrodynamic Stability of Marangoni Films ..... 620
Hydrodynamics of Wave Flow ... 772
Hydrogen Bonding in Alcohols ... 497
Hydroisomerization of Normal Pentane over a Zeolite Catalyst .. 852

I

Impact Tube Measurements in Dilute Polymer Solutions ..... 663
Incipient Pool Boiling of Sodium .. 654
Interaction Energy in Surface Diffusion ..... 809
Introduction to the Stability of Distributed Systems via a Liapunov Functional, An ..... 558
Investigation of Absorption-Reaction of Carbon Dioxide in Liquid Diethanolamine by the Direct Chromatographic Perturbation Method, An ..... 280
Iterative Techniques in Optimization. I. Dynamic Programming and Quasilinearization . 908

K

Kinetic Approach for Polymer Solution Data, A ..... 61
Kinetic Theory of Catalysis and Mass Transfer in a Cylinder, A 599
Kinetics of Physical Adsorption of Propane from Helium on Fixed Beds of Activated Alumina .. 19
Kinetics of Reaction and Crystallization in Condensed Phases: the Aqueous Potassium Dipiclamine System ..... 266

Kinetics of Thiopene Hydrogenolysis on a Cobalt Molybdate Catalyst ..... 159

L

Laminar Dispersion in Capillaries: Part V. Experiments on Combined Natural and Forced Convection in Vertical Tubes 100
Laminar Forced Convection in Eccentric Annuli ..... 510
Laminar Liquid Jet Diffusion Studies ..... 286
Local and Average Interphase Heat Transfer Coefficients in a Randomly Packed Bed of Spheres 483
Local Compositions in Thermodynamic Excess Functions for Liquid Mixtures ..... 135
Longitudinal Dispersion of Liquid Flowing through Fixed and Fluidized Beds ..... 857
Low-Order Approximations for Membrane Blood Oxygenators 669

M

Mass Transfer across Mobile Interfaces ..... 531
Mass Transfer and Wake Phenomena ..... 260
Mass Transfer between Immiscible Liquid Metals ..... 235
Mass Transfer Rates for Vaporization and Gas-Phase Controlled Desorption in a Short Wetted Wall Column ..... 986
Mass Transfer Through Horizontal Liquid Films in Wavy Motion 57
Mass Transfer to Falling Films: I. Application of the Surface Stretch Model to Uniform Wave Motion ..... 458
Mathematical Model of a Packed-Bed Heat-Exchanger Reactor for Dehydrogenation of Methylcyclohecane, A: Comparison of Predictions with Experimental Results ..... 69
Mathematical Modeling and Numerical Integration of Multicomponent Batch Distillation Equations ..... 190
Measurement of Thoroughness of Mixing ..... 813
Measurement of the Velocity of Gases with Variable Fluid Properties ..... 227
Mechanism of Heat Transfer in a Spray Column Heat Exchanger, The ..... 398
Mechanism of Interfacial Mass Transfer in Membrane Transport ..... 421
Method of Addition for Deriving Continuous Withdrawal Equations, The ..... 837
Method of Finding Simultaneously the Values of the Heat Transfer Coefficient, the Dispersion Coefficient, and the Thermal Conductivity of the Packing in a Packed Bed of Spheres, A: Part I. Mathematical Analysis [Vol. 13, p. 678 (1967)]. Erratum ..... 526
Method of Predicting Boiling Pressure Drop for Alkali Metals, A 509
Methods for Solving the Boundary Layer Equations for Moving Continuous Flat Surfaces with Suction and Injection ..... 726
Methods of Predicting the Occurrence and Type of Fluid-Fluid Equilibria in Binary Systems.. 821
Model for the Prediction of Velocity and Void Fraction Profiles in Two-Phase Flow, A ..... 750
Multiphase Viscoelastic Flow Through Porous Media ..... 50

N

Nonlinear Feedforward Control of Chemical Reactors ..... 37
Nonlinear Least Squares for Model Screening ..... 513
Nonsteady Flow of Fluids through Expansible Tubes, The ..... 876
Nonuniform Initiation of Photoreactions. III. Reactant Diffusion in Single-Step Reactions .... 798
Note on the Thermodynamics of Surface Tension of Binary Solution, A ..... 973
Numerical Evaluation of Models Describing Non-Newtonian Behavior ..... 980
Numerical Solution of Large Systems of Linear Differential Equations, The ..... 46

O

Observations in Ternary Liquid Phase Equilibria of *n*-Propanol-Benzene-Ethylene Glycol System ..... 666
On a Transport of Equation Describing Steady Diffusion through a Stagnant Gas ..... 350
On Certain Unsteady Torsional Flows of Simple Fluids ..... 275
On Negative Temperature Coefficients for Surface Diffusion .. 650
On the Correlation of Critical Properties of Mixtures ..... 673
On the Narrowing of Particle-Size Distributions in Staged Vessels with Classified Product Removal ..... 827
On the Theoretical Calculation of Friction Factors for Laminar, Transitional, and Turbulent Flow of Newtonian Fluids in Pipes and between Parallel Plane Walls ..... 691
On the Use of Krasovskii's Theorum for Stability Analysis ..... 356
Operational Methods for a Convective Diffusion Equation ..... 817
Optimal Control of a Distillation Column ..... 467

P

Penetration Theory Applied to Unsteady Gas Absorption with Irreversible First-Order Reaction 678
Pool Boiling Heat Transfer to Cryogenic Liquids ..... 372
Prediction of Drag Reduction with a Viscoelastic Model ..... 434
Prediction of Multicomponent Heats of Mixing for Simple Liquid Systems Using Binary Data ..... 833
Pressure Dependence of Liquid Phase Mass Transfer Coefficients ..... 962
Procedure for Fitting Non-Newtonian Viscosity Data ..... 814
Promotion of Drop-by-Drop Condensation of Steam from Sea Water on Vertical Copper Tube ..... 245
Properties of the Transient Heat Transfer (Single-Blow) Temperature Response Function .. 499
Pseudoparticulate Expansion of Screen-Packed Gas-Fluidized Beds, The ..... 917

Q

Quasilinearization, Difference Approximation, and Nonlinear Boundary Value Problems ... 490
Quasilinearization and Invariant Imbedding in Optimization .... 976

R

Rates of Evaporation of Sprays, The ..... 541
Reactions of Ethylene with Triethyl Aluminum: Effect of Operating Variable and Kinetics of Reaction ..... 325
Response of a Tubular Heterogeneous Catalytic Reactor to a Step Increase in Flow Rate ..... 627
Rise Velocity of Bubbles in Tubes and Rectangular Channels as Predicted by Wave Theory, The ..... 295
Role of Concentration Level of the Nondiffusing Species in Turbulent Gas-Phase Mass Transfer at Ordinary Mass Transfer Rates ..... 577

S

Significance of Adsorption Equilibrium Constants of Rate Equations Involving Solid Catalysts 984
Similarity Type of Solutions of the Turbulent Boundary Layer Equations for Momentum and Energy: Part I. An Analysis of Some Existing Solutions ..... 440

Simple Method for Derivation of Concentration Transfer Functions for Flow Systems, A .... 363
Simplified Method for the Prediction of Multicomponent Adsorption Equilibria from Single Gas Isotherms, A ..... 351
Simplified Procedures for Diaphragm-Cell Diffusion Studies 671
Sinusoidal and Pulse Response of a Plate Distillation Column by Reflux Upset ..... 866
Small-Scale Tests for Attrition Resistance of Solids in Slurry ... 553
Solids Mixing in Fluidized Beds... 388
Some Properties of the Apparent Water Paradox in Entrainment 838
Some Remarks on the Stability of Parallel Flows of Non-Newtonian Fluids ..... 658
Stability of Adiabatic Packed Bed Reactors, The: Effect of Flow Variations and Coupling between the Particles ..... 636
Erratum ..... 993
Stability of Batch Catalytic Fluidized Beds ..... 211
Stability of Naturally Bounded Nonlinear Systems ..... 3
Stability of Numerical Integration Techniques ..... 946
Stability of Reaction on a Spherical Particle ..... 301
Steady State Behavior of Crystallizers with Classified Product Removal, The ..... 612
Studies of Intramembrane Transport: A Phenomenological Approach ..... 110
Study of the Effect of Sample Size on the Analysis of Power Mixtures, A ..... 169
Synthesis of System Design, The: I. Elementary Decomposition Theory ..... 343

T

Temperature Jump at the Inlet of the Continuous Phase in a Spray Column Heat Exchanger, The ..... 831
Test of Phillips' Hypothesis for Eddy Viscosity in Pipe Flow, A ..... 825
Thermal Instability of a Horizontal Layer of Water Near 4°C. .. 652
Thermodynamic Equilibrium in the Vapor Phase Esterification of Acetic Acid with Ethanol .... 606
Thermodynamic Properties of Binary Mixtures of 1-Hexyne and Polar Organic Solvents ..... 737
Thermodynamic Relationship between Integral Heat of Vaporization and Isobaric Equilibrium Vapor-Liquid Compositions, A ..... 988
Transient Diffusion from a Well-Stirred Reservoir to a Body of Arbitrary Shape ..... 956
Transient Natural Convection in a Vertical Cylinder ..... 251
Tubular Flow Photoreactors for Complex, Nonchain Kinetics 584
Turbulent Flow in Concentric Annuli ..... 164
Turbulent Heat Transfer in Drag-Reducing Fluids ..... 406
Two Phase Friction Factor for Para-Hydrogen between One Atmosphere and the Critical Pressure ..... 895

U

Use of Molecular Shape Factors in Vapor-Liquid Equilibrium Calculations with the Corresponding States Principle ..... 568

# Subjects

The *A.I.Ch.E. Journal* is using the key words as part of the index to Volume 14. The boldface number indicates the role that the key word plays in the article; the lightface number is the page number. The roles of these key words have been made to conform with the modified definition of roles presented in *Chem. Eng. Progr.*, Vol. 60, No. 8, p. 88 (August, 1964).

A

Absorption—4, 577; 8, 280, 286; 10, 798
Accuracy—7, 123
Acentric Factor—6, 479
Acetic Acid—0, 606
Acetone—9, 737
Acetonitrile—9, 737
Activity Coefficients—8, 135, 318
Adiabatic—10, 335
Adsorption—7, 19, 740, 762; 8, 19, 25, 740, 762, 886; 10, 627
Adsorption Rate Constants—7, 8, 762
Agitation—6, 325, 790
Air—1, 388, 426; 5, 388, 541, 917; 9, 164, 541, 750, 928
Algorithms—10, 32, 467
Aliphatic Compound—9, 923
Alkanes—9, 923
Alum—9, 452
Alumina—5, 19
Ammonium Sulfate—9, 452
Amplitude—6, 57
Analog Computer—10, 181
Analysis—7, 8, 169
Angular Coordinate—6, 939
Annuli—9, 164
Annulus—10, 553
Argon—9, 372
Aromatic Hydrocarbons—9, 92; 5, 318
Arrhenius Equation—4, 490
Atmosphere—9, 746
Attrition—8, 9, 553
Automatic Control—7, 8, 173, 181
Autorefrigerated—0, 880
Axial—0, 599
Axial Diffusion—9, 490
Axial Distance—6, 939

B

Batch—0, 37, 190, 798, 880
Batch Crystallization Apparatus—10, 266
Baffles—6, 222
Barium—2, 235
Bed Height—6, 426
Behavior—8, 591
Benedict - Webb - Rubin Equation of State—10, 92, 923
Benzene—2, 473
Benzoic Acid—2, 722
β-Rays—1, 426
Binary—0, 25, 737, 740
Blood—1, 703
Boiling—8, 372
Boundaries—8, 3
Boundary Layers—9, 127, 483
Boundary Layer Equations—9, 726
Bransom's Model—10, 118
Bubbles—6, 388; 9, 222, 295, 709, 917
Bubble Columns—4, 9, 222

Bubble Diameter–2, 7, 9, 426
Bubble Injection–10, 388
Bubble Volume–7, 383
Buoyancy–1, 295
Burners–9, 127
Burning–4, 301
Burton - Cabrera - Frank theory–10, 266
Butane–2, 159
n-Butane–9, 762, 886
Butenes–2, 325

C

Calculation–8, 691, 876, 9, 923
Calorimeter–10, 923
Canning-Randolph Model –10, 118
Capillaries–9, 100, 939
Capillary Pressure–7, 50
Carbohydrates–9, 111
Carbon Dioxide–1, 280; 5, 917; 9, 286, 479, 928
Carbon Tetrafluoride–9, 372
Catalysis–4, 473; 8, 473, 599
Catalyst–2, 301; 9, 211; 10, 159, 301, 325, 483, 852
Catalyst Particles–5, 558
Cellophane–5, 111; 9, 421
Channels–9, 295
Characteristic Numbers –2, 426
Chemical Engineering–4, 46
Chemical Reaction–0, 606; 9, 301
Chemisorption–8, 25
Chromatographs–10, 25
Chromatography–10, 280, 762, 886
Chromium–1, 235
Circulation–6, 7, 222; 8, 222, 746
Classifiers–8, 9, 612
Classifying–6, 8, 612
Cleaning–8, 245
Cobalt Molybdate–10, 159
Columns–4, 620; 10, 917
Communications–4, 173
Comparisons–8, 923
Composition–6, 227, 606; 10, 135
Composite phase plane–2, 335, 934
Computer–8, 85, 876; 10, 85, 577, 720, 870, 880
Concentration–6, 19, 61, 111, 266, 392, 577; 7, 939
Concentration Profiles–9, 722
Concentric–0, 164
Condensation–8, 245, 928; 9, 245
Condensers–4, 620
Conductivity Cell–10, 426
Cone & Plane Viscometer–10, 275
Constant Volume–0, 956
Constrained Integration 2, 335
Constraints–10, 173, 181
Container–9, 720
Continuous–0, 37, 190, 636, 726, 798, 880
Continuous Stirred Tank Reactor–9, 3
Control–4, 46, 85, 211; 7, 173, 181; 8, 37, 85, 173, 181, 467, 783, 866; 9, 783
Controller–7, 37; 8, 37, 173; 9, 3, 37
Convection–6, 100, 227, 903; 7, 251; 8, 251, 577; 10, 251
Conversion–4, 245; 7, 798, 857
Coolers–4, 620
Copper–9, 245
Correlation–2, 415; 8, 242, 415; 9, 857
Corresponding States–10, 568
Coupled Reaction and Crystallization–8, 266
Coupling–6, 77
Creeping Flow–8, 145
Critical Pressure–6, 479; 9, 895
Critical Temperature–6, 479
Cross Coefficient–8, 111
Crushing–10, 553
Cryogenic–0, 372
Crystals–2, 118; 9, 448, 452
Crystallization–8, 612
Crystallization Kinetics–8, 266
Crystallizers–8, 118, 448, 452, 612; 9, 448, 452, 612
Curvilineal–0, 275
Cyclohexane–1, 8, 473
Cylinder–9, 123, 251; 10, 599, 720
Cylindrical–0, 331

D

Damping–6, 434
Darcy's Law–10, 50
Decomposition–10, 343
Degradation–6, 434
Degree of Freedom of Probability Distribution–1, 7, 426
Dehumidification–8, 928
Dehydrogenation–10, 69
Density–4, 479; 6, 9, 100, 260, 448, 452; 7, 479, 917; 8, 426
Density Fluctuations–9, 426
Depth–6, 251
Design–8, 343; 4, 483, 426, 703
Desorption–4, 577
Dialysis–8, 421
Dialyzer–8, 10, 421
Diameter–6, 9, 100, 151, 406, 434, 541
Diethanolamine–5, 280
Diethylphthalate–5, 61
Difference Equations–10, 946
Differential Equations–9, 46, 908, 946; 10, 726
Differential Reactor–10, 473
Diffusion–6, 790, 798; 7, 531, 599, 939; 8, 392, 421, 531, 577, 599, 722, 886, 939, 956; 9, 19, 473, 726
Diffusivity–6, 392, 620; 8, 286, 577, 762, 886, 956
Digital Computer–10, 46, 190, 928, 946, 956
Dilute–0, 599
Dimensionality–7, 908
Dimethyl Carbonate–9, 737
Dimethyl Formamide–9, 737
Discontinuous–0, 32
Discrete–0, 32
Dispersion–7, 8, 100, 939; 9, 709
Dispersion Coefficient–7, 100; 8, 100, 939
Dispersion Model–8, 857
Dissolution–8, 722
Dissolution from Cast Pipes–9, 722
Distance–6, 421
Distance from Air Distribution Plate–6, 426
Distillation–4, 946; 8, 190; 9, 190, 467
Distillation Column–7, 866; 9, 85, 190, 866
Distributed Parameter–1, 335, 934
Distributed Systems–10, 588
Distribution–8, 612
Distribution Coefficient–8, 111
Disturbances–6, 3, 37
Drag–4, 440; 6, 406; 7, 331, 434, 870; 8, 331, 870; 9, 434
Drag Coefficients–8, 145
Drift–7, 57
Drops–1, 541; 2, 245; 9, 9, 235, 260, 411, 531, 541, 709, 903
Dynamic–0, 85, 591, 908; 8, 77, 173, 627
Dynamic Response–8, 857

E

Eccentricity–6, 123
Economics–8, 343
Eddy–8, 577
Eddy Diffusivity–7, 421
Eddy Diffusivity Model –10, 164
Effective Diffusivity–7, 696
Effectiveness Factor–7, 311, 696; 8, 311
Efficiency–7, 222, 531
Electrodes–4, 620
Energy–9, 726
Energy of Mixing–8, 135
Enthalpy–4, 479; 7, 8, 9, 923
Entrance Region–6, 483
Eotvos Number–6, 295
Equations–10, 135
Equation of Continuity –8, 50
Equation of Motion–8, 50, 275; 10, 275
Equation of State–8, 479; 10, 923
Equilibria–8, 318
Equilibrium–8, 25, 280, 473, 606; 9, 473
Equilibrium Constant–7, 606; 8, 61, 325, 762
Error–6, 173, 181
Escape–6, 612
Esterification–9, 606
Estimation–4, 750
Estimating–8, 722
Ethane–9, 740, 762, 886
Ethanol–0, 606; 1, 627
2-Ethoxyethyl Acetate–9, 903
Ethyl Acetate–1, 2, 790
Ethylene–1, 325; 9, 286
Ethyl Ether–2, 627
Evaporation–7, 541; 8, 541, 599
Excess Gibbs Energies–8, 135
Expansible Tube–9, 876
Expansion–8, 917
Experiment–9, 923; 10, 627
Experimental–0, 69, 151, 531, 533, 737, 740, 746, 866, 928; 10, 606
Extraction–4, 9, 411, 790, 908; 7, 531; 8, 235, 531, 790; 9, 10, 790
Extractor–9, 790; 10, 531, 790

F

Fall–7, 8, 260
Falling Cylinder Viscometer–9, 10, 123
Falling Liquid Films–9, 772
Feedback–10, 173, 181, 467
Feedback Control–8, 3
Feedback Uncoupling–10, 783
Feedforward–0, 37, 173, 181
Feedforward Compensation–10, 783
Ferric Oxide Gel–5, 696
Ficks' Equation–10, 19
Film–9, 57, 458, 620
Film Condensation Coefficients–7, 8, 644
Filtration Coefficient–8, 111
Finite Difference Method–8, 490; 10, 49, 939
Fins–6, 644
Fixed Bed–9, 483; 10, 19, 857
Flat–0, 726
Flow–6, 127, 260, 406, 703; 7, 61, 164, 260; 8, 50, 61, 123, 145, 164, 222, 260, 275, 415, 434, 876, 895; 9, 151, 164, 406, 434, 750, 758, 870; 10, 553
Flow Measurement–6, 411
Flow Rate–6, 415, 627, 790, 903
Flow Reactors–8, 584; 10, 696
Fluid–9, 50, 77, 123, 145, 222, 275, 331, 406, 434, 758, 876
Fluid Mechanics–8, 440
Fluid Mixing–8, 857
Fluid Velocity–6, 857
Fluidization–8, 426
Fluidized Bed–2, 388; 9, 917; 10, 211, 388, 426, 857
Force Balance–10, 9
Forced–0, 100
Form Factor–10, 870
Formation–6, 531; 7, 8, 9
Fourdrinier Weave–0, 415
Fraction Voids–6, 857
Freezing–8, 9, 720
Frequency–6, 57
Frequency Distributions –9, 426
Frequency Response–2, 10, 857; 8, 77, 591, 866
Frictional Coefficients–7, 111
Friction Factor–7, 691; 8, 406, 415, 895
Fuel–9, 235
Fugacity–8, 568; 10, 92, 740
Full Twill Weave–0, 415

G

Gain–8, 3
Galerkin's Method–10, 145
Gas–1, 19; 5, 426, 577; 9, 19, 25, 227, 286, 392, 599, 740
Gasoline–9, 852
Gas Absorption–4, 7, 8, 9, 458
Gas-Film Resistance–6, 311
Gas Lifts–4, 222
Gas Phase–7, 577
Gas Velocity–6, 426
Geiger-Mueller Counter –10, 426
Generalized Constants–8, 479
Geometric–0, 32
Glass–9, 917
Glass Beads–1, 426

Glycerin–9, 750
Growth–0, 411; 6, 452; 7, 118, 448, 452; 8, 118

H

Heat–9, 301
Heat Capacity–6, 77, 301
Heat Exchanger–8, 9, 69
Heat Flux–6, 251
Heat of Reaction–8, 280
Heat Transfer–4, 620, 946; 6, 77; 7, 127, 151, 251, 406, 483, 709; 8, 127, 151, 245, 251, 372, 398, 406, 434, 440, 483, 709, 726, 746, 928; 9, 473
Heat Transfer Coefficient –4, 440; 7, 483, 644; 8, 483, 644, 746
Helium–1, 19; 5, 917; 9, 19, 415, 928
Henry's Law–10, 92
n-Heptane–5, 318
Heterogeneity–6, 740
Heterogeneous–0, 636
Heterogeneous Catalysis –4, 627
Hexane–5, 553
1-Hexyne–9, 737
High Pressure–0, 92, 318
Holdup–6, 398, 709; 7, 222
Homogeneous–0, 325
Homogeneous Model–8, 311
Horizontal–0, 750
Horizontal Screens–6, 426
Hot Wire Anemometry– 10, 227
Hydrocarbons–9, 92, 242, 479, 923
Hydrodynamic–0, 620; 7, 644
Hydrogen–2, 69, 473; 5, 473; 9, 392
Hydrogenolysis–8, 9, 159
Hydroisomerization–8, 852
Hyperfiltration–4, 8, 715

I

IBM 1620 Computer– 10, 722
I-Butene–2, 325
Immiscible–0, 9, 151
Immobile–0, 740
Imperfect–0, 880
Improvement–4, 852
Inequalities–8, 32; 9, 558
Inequality Constraint–9, 32
Inert–5, 577
Initiation–6, 798
Injection–6, 227; 10, 9, 726
Integral Method–10, 726
Intensity of Density Fluctuations–2, 7, 426
Intensity of Pressure Fluctuations–2, 7, 426
Interaction–6, 111
Interfaces–9, 531
Interface Displacement– 7, 388
Interfacial–0, 151, 709
Interfacial Area–7, 790; 9, 9
Interfacial Resistance–6, 392
Interfacial Tension–6, 9
Integral Equation–9, 956
Integration–8, 9, 946
Intermembrane Transport–7, 8, 111
Internal–0, 19
Intraparticle Diffusion–6, 762
Ion Exchange Resin–5, 627
Ionization Heat–8, 280
Isomerization–8, 852
Isothermal–0, 696, 923
Iteration–10, 908

J

Jets–10, 286

K

K-Constants–8, 318, 568
Kerosene–1, 398; 5, 553
Kinetics–4, 946; 6, 452; 7, 584; 8, 69, 159, 325, 452, 473, 584; 9, 69, 159, 311
Knudsen Numbers–8, 599

L

Laminar–0, 100, 415, 434, 939
Laminar Flow–8, 722
Langmuir - Hinshelwood Equation–10, 159
Lanthanum–2, 235
Laplace Transforms–10, 173, 181
Lead–9, 917
Least Squares–10, 479
Level–6, 577
Leveque Equation–10, 722
Liapunov's Method–10, 3
Light Rays–1, 426
Linear–0, 783
Linear Equations–10, 77
Liquids–0, 458; 1, 2, 720, 790; 5, 295, 458; 6, 251; 9, 9, 135, 151, 251, 260, 286, 372, 541, 620, 790, 857
Liquid Extraction–10, 591
Liquid-Liquid Equilibria –8, 135
Liquid-Liquid Mixing–8, 531
Liquid Metals–9, 235
Liquid Phase–5, 266
Longitudinal–0, 857
Loss–6, 301; 8, 9, 553
Low Temperature–0, 92, 318, 372

M

Magnesium–5, 235
Marangoni Effect–8, 620
Martinelli Model–10, 895
Mass–7, 577
Mass Transfer–4, 411; 6, 227; 7, 57, 111, 222, 260, 421, 531, 599, 709, 903; 8, 57, 111, 222, 235, 260, 286, 421, 434, 531, 599, 703, 709, 715, 726, 790, 903, 928; 9, 473, 722
Mass Transfer Coefficients–7, 790; 8, 325
Mass Transfer Rate–2, 458
Mathematics–10, 301, 343, 939
Mathematical Analysis– 10, 311
Mathematical Model–8, 69, 190, 411, 452, 612; 9, 398; 10, 100, 118, 169, 173, 181, 211, 251, 627, 709, 750, 852
Mathematical Solution– 10, 722
Means–9, 32
Measurement–0, 627; 4, 956; 7, 798
Melting–8, 9, 720
Membrane–9, 111, 421
Membrane Oxygenator– 4, 10, 703
Mercury Porosimeter–10, 696
Metal–5, 392
Methane–9, 318, 372, 740, 923
Methyl Acetate–9, 903
Methylcyclohexane–1, 69; 5, 318
Mixers–9, 10, 790
Mixing–6, 798, 880; 7, 790; 8, 135, 169, 388; 9, 169
Mixing Cell Model–10, 591
Mixing Length–1, 10, 691
Mixtures–9, 25, 135, 372, 737, 740, 923, 928
Mobile–0, 531, 740
Model–4, 426; 10, 644, 740
Modeling–8, 473
Molecular Shape Factor– 10, 568
Molecular Sieves–9, 553
Momentum–9, 726
Momentum Transfer–8, 434, 726
Mordenite–10, 852
Multicomponent–0, 190, 709
Multiphase Systems–9, 709
Multivariable–0, 783

N

Naphthenes–5, 318
Navier Stokes Equation– 1, 10, 772
Newtonian–0, 9, 123, 145, 415
Newtonian Fluid–5, 691
Nickel–9, 917; 10, 325
Nitroethane–9, 737
Nitrogen–9, 372, 415
Nitrogen Adsorption–10, 696
Nitrous Oxide–9, 286
Noise–6, 173, 181
Nonadiabatic–10, 335, 934
Nondiffusing–6, 557
Noninteracting–0, 783
Nonlinear–0, 32, 37
Nonlinear Equation–1, 10, 772; 9, 32
Nonlinear Model–7, 703
Nonlinear Ordinary Differential Equation–4, 490
Nonlinear Systems–9, 3
Non-Newtonian–0, 61, 123, 145, 275, 406, 758
Non-Newtonian Fluid–6, 703
Nonrandom–0, 135
Nonuniform–0, 798
Nonviscometric–0, 758
Nozzle–9, 9
Nucleate Boiling–8, 372
Nucleation–6, 8, 452; 7, 448, 452
Numerical–0, 46; 10, 577
Numerical Solution–2, 703; 8, 10, 490
Numerical Stability–8, 490
Nusselt Number–8, 406

O

Octane Number–9, 852
Oil–9, 151
Olefins–2, 325
On-Line–0, 85
Operating Conditions–6, 584
Optimization–4, 32; 8, 32, 85, 173, 181, 343, 467, 908
Orientation–6, 331
Orifices–6, 411
Orthogonal Rheometer– 8, 10, 758
Orthohydrogen–2, 9, 696
Oscillation–6, 531
Oxygen–1, 703; 9, 286, 372, 703

P

Packed Beds–9, 483; 10, 69
Packed Column–9, 591
Packing–6, 917; 9, 77; 10, 77, 917
Paraffins–5, 318; 9, 92
Paraffin Hydrocarbons– 9, 568
Parahydrogen–1, 696; 9, 696, 895
Parallel Disk Viscometer –10, 275
Parallel Plate–5, 691
Partial Differential Equation–9, 956
Particle–1, 388; 9, 19, 331, 388, 709
Particle Density–6, 696, 857
Particle Size–6, 426, 696, 857
Particle Size Distribution –6, 709
Peak Nucleate Boiling Flux–8, 372
Peclet Number–6, 100, 939
Penetration Theory–10, 531
Pentane–1, 852
Perforated Plates–10, 531
Performance–7, 452, 612, 790
Periodical Solutions–10, 772
Permeability–7, 8, 50
Permeation–7, 392; 8, 111, 392
Perturbation–10, 280
Phase Equilibria–8, 92, 135, 318
Phenomenological Coefficients–8, 111
Photocell–10, 426
Photochemical–0, 584
Photoreactors–8, 9, 584
Photoreactions–8, 9, 798
Photosensitization–10, 798
Physical Model–9, 398
Physical Properties–6, 111
Pilot Plant–0, 467
Pipe–5, 691; 9, 151, 406, 434
Plain Dutch Weave–0, 415
Plain Square Weave–0, 415
Plants–2, 9, 343
Platinum-on-Alumina–4, 5, 473
Plug Flow–1, 335, 934
Poles–10, 46
Polyacrylic Acid–9, 61
Polymers–6, 434; 9, 61, 111, 434
Polymer Melt–9, 758
Polymethyl-

methacrylate–9, 61
Polynomials–9, 32
Pool Boiling–4, 222; 8, 372
Pores–9, 19, 886
Pore Size Distribution–6, 696
Pore Volume–6, 696
Porosity–7, 917
Porous Media–5, 50
Position–6, 483
Potable Water–2, 715
Potassium Dipicylamine–9, 266
Powders–9, 169
Power Law Fluids–9, 123, 145
Predicting–8, 722, 772
Prediction–4, 8, 458
Pressure–4, 479; 6, 127, 325, 392, 473, 923; 7, 50, 479; 8, 426, 876
Pressure Balance–2, 411
Pressure Drop–6, 406; 7, 415; 8, 415, 895; 9, 750
Pressure Fluctuations–9, 426
Pressure Gradient–6, 111
Process–2, 343; 9, 46, 173, 181, 343
Product Composition–7, 627
Profiles–7, 411
Programming–8, 32, 908
Promotion–8, 245
Propane–2, 19; 9, 19, 762, 886, 923
Properties–6, 227
Propylene–9, 286
Pulse–6, 866; 8, 876
Pulse Input–1, 10, 857
Pulse Testing–10, 591
Pulse Tests–8, 866

Q

Quasilinearization–8, 490; 6, 10, 908

R

Radial–0, 599
Radial Diffusion–6, 584
Radial Distance–6, 939
Radiant Energy–6, 584
Radiation–9, 798
Radius–6, 164
Rate–7, 19, 790; 8, 19
Reaction–6, 599; 7, 8, 325
Reaction and Diffusion–8, 696
Reaction Kinetics–4, 627; 8, 159
Reaction Rate–6, 311; 7, 77, 473; 8, 473, 636
Reactor–4, 301; 8, 69, 211; 9, 37, 69, 77, 211, 483, 627, 636, 880; 10, 235, 426
Reactor Performance–4, 857
Reactor Volume–7, 857
Reboilers–9, 746
Rectangular–0, 644
Rectification–9, 467
Redlich-Kwong Equation–10, 923
Reduced Pressure–6, 242
Reduced Temperature–6, 242
Reduction–7, 8, 434
Reflux–7, 866
Regeneration–4, 301
Relaxation–8, 758
Reliability–8, 173
Reprocessing–4, 235
Reservoir–9, 956
Residence Time–6, 531 612, 703; 7, 222
Residence Time Distribution–6, 709
Resistance–8, 421
Resistance Coefficient–7, 50
Response– 7, 3; 8, 37
Reverse Osmosis–4, 8, 715
Reynolds Number–6, 260, 421, 473; 8, 415
Rheological Model–10, 758
Rheological Properties–8, 61
Rheology–8, 61, 758
Ripples–6, 458
Rippling–0, 458
Rivlin-Erickson Model–10, 758
Rotating Disk–5, 8, 715
Runge-Kutta Method–10, 490

S

Salt–3, 715
Salt Concentration–7, 715
Salt Water–1, 9, 715
Sample–9, 169
Sand–9, 917
Saturation–6, 50
Scatchard-Hildebrand Equation–10, 92
Schmidt Number–6, 421
Screen–9, 415; 10, 917
Sea Water–1, 245
Sedimentation–4, 870
Semipermeable Membrane–5, 10, 715
Separation–4, 8, 790
Settling–7, 8, 331
Shape–6, 720, 870
Shape Factor–10, 870
Shear–7, 61
Shearing–8, 758
Sherwood Number–7, 8, 421
Shrinking Core Model–8, 311
Silica Gel–5, 740, 762, 886; 9, 553
Similarity Transformation–10, 440
Simplification–8, 343
Simulation–8, 190, 411, 880
Sinusoidal Input–1, 10, 857
Size–6, 19, 118, 169, 260, 541; 7, 9, 448, 452, 612, 917; 8, 9, 118, 612; 9, 612
Slab–10, 720
Slab Reactor–10, 798
Slurry–9, 553
Small Perturbation Expansion–10, 440
Sodium Chloride–9, 452
Solid Body–9, 956
Solid-Gas Reactions–4, 311
Solid Particles–5, 857
Solids–1, 388, 720; 5, 426; 9, 25, 388, 553, 620
Solubility–8, 325
Solution–8, 46, 726, 908; 9, 61, 434
Solvents–6, 325; 9, 92, 111
Spacing–6, 57
Specific Heat–6, 127
Sphere–9, 145, 301, 483, 903; 10, 720
Spheroids–9, 870
Spray Column–10, 398
Spray Drying–4, 541
Stability–4, 558; 7, 211, 301, 620, 636, 880; 8, 3, 211, 301, 558, 620, 636, 880, 946
Stability Regions–2, 335, 934
Stainless Steel–5, 392
Stanton Number–2, 458
Start Up–6, 211
Stationary State–9, 584
Statistics–10, 426
Steady State–0, 57, 211, 301, 612, 758; 7, 8, 636
Steam–1, 245
Stirred–0, 37
Stokes Flow–9, 870, 903
Stokes Regime–9, 331
Stress–8, 9, 758
Strontium$^{90}$–10, 426
Subdividing–10, 343
Sublayer–9, 406
Sublimation–8, 599
Suction–6, 227; 10, 726
Sugar–9, 421
Superheated–0, 928
Surface–9, 301, 726, 886
Surface Active Agents–6, 709
Surface Area–6, 696
Surface Migration–8, 696
Surface Stretch Model–1, 10, 458
Surface Tension–1, 295; 6, 620
Suspension–9, 448, 709
Synthesis–8, 343
System Quality–2, 934
Systems–2, 343; 9, 32

T

Tanks–9, 37
Temperature–6, 77. 127, 211, 227, 266, 325, 392, 398, 473, 541, 606; 8, 69, 251
Temperature Profiles–10, 398
Tension–6, 151
Terminal Velocity–8, 295
Testing–8, 421
Tests–8, 553
Tetrakis Octadecyl Thio Silane–10, 245
Theoretical–0, 69, 295, 531, 740, 798, 928; 10, 606
Theory–8, 772; 10, 691
Thermal Conductivity–6, 301
Thermal Data–0, 606
Thermodynamic Coefficients–8, 111
Thermodynamic Properties–8, 135, 568, 737
Thermosiphon–0, 746
Thickness–6, 57, 620; 8, 406
Thiele Modulus–7, 696
Thiophene–1, 159
Time–7, 8, 720
Time Dependent Velocity Field–8, 939
Time Lag–7, 8, 392
Time Solution–8, 46
Toluene–2, 69; 5, 318
Torsional–0, 275
Torsional Viscometer–10, 275
Tortuosity–7, 111
Tracer–1, 388; 9, 388, 857
Transcendental Method–10, 726
Transfer–7, 577
Transfer Functions–7, 8, 77; 10, 173, 181
Transient–0, 627, 956
Transitional–0, 127
Transitional Flow–4, 9, 691
Transport Equation–10, 599, 709
Tridiagonal Matrix–10, 490
Triethyl Aluminum–1, 325
Tube Entrance Region Velocity Field–8, 939
Tubes–9, 100, 245, 295, 644, 876, 939; 10, 644, 750
Tubular–0, 37, 584, 627, 636
Tubular Reactor–5, 558; 9, 490; 10, 335, 798, 934
Turbulent–0, 127, 151, 164, 415, 434; 7, 577
Turbulent Boundary Layers–9, 440
Turbulent Flow–4, 9, 691
Twilled Dutch Weave–0, 415
Two-Liquid Model–10, 135
Two-Phase–0, 50, 750, 895
Two-Point Boundary Value Problem–4, 490

U

Ultrafiltration–4, 8, 715
Uncoupling–0, 783
Unsteady State–0, 190, 946
Uranium–1, 235

V

Vacuum–9, 746
Vapor–9, 222
Vapor-Liquid Equilibria–8, 92, 135, 318, 568, 737
Vapor Phase–0, 923
Vapor Pressure–8, 737
Vaporization–4, 577
Velocity–6, 9, 19, 151, 434, 541; 7, 123, 227, 331; 8, 164, 227, 876; 9, 577
Velocity Distribution–2, 7, 772; 9, 440, 772
Velocity Profiles–1, 458; 6, 584; 8, 750
Vertical–0, 100, 245, 251, 620, 644, 746
Vertical Cylindrical Cylinders–8, 722
Viscoelastic–0, 50, 275, 434
Viscoelastic Model–10, 434, 758
Viscometer–9, 10, 123
Viscosity–6, 9, 61, 127, 151; 7, 242; 8, 758
Viscous–0, 406
Void-Fraction Profiles–8, 750
Volume–6, 151
Vortex–8, 260

W

Wake–7, 398; 8, 260
Wake Law–4, 440
Wall–6, 331
Wall Law–4, 440
Water–1, 398, 790; 2, 627, 722; 5, 286, 876, 903; 9, 151, 415, 750, 857, 928
Wave–6, 9, 57
Wave Amplitude–2, 7, 9, 772
Wave Length–2, 7, 9, 772
Wave Motion–8, 9, 772
Wave Theory–10, 295
Wave Velocity–2, 7, 9, 772
Wiener's Method–10, 173, 181

Z

Zeolite–10, 852
Zero–10, 46
Ziegler Catalyst–1, 325